THE CITY OF SAN DIEGO

City of San Diego Water Department
Report on Water Quality Relative to Public Health Goals

July 1, 2004

Background:

Provisions of the California Health and Safety Code specify that the City of San Diego Water Department, and other water utilities with more than 10,000 service connections, prepare a special report by July 1, 2004 if their water quality measurements exceeded any Public Health Goal (PHG) in calendar years 2001, 2002, and 2003. PHGs are non-enforceable goals established by the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA). The law also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the Maximum Contaminant Level Goals (MCLGs) adopted by United States Environmental Protection Agency (USEPA). Only constituents which have a California Maximum Contaminant Level (MCL) or action level and either a PHG or MCLG that has been exceeded are to be addressed in this report. Included in this report is the numerical public health risk associated with the MCL and PHG or MCLG, the category or type of risk to health that could be associated with each constituent level, and an estimate of the cost to implement specified treatment if it is appropriate and feasible.

What are PHGs?:

PHGs are set by the OEHHA and are based solely on public health risk considerations. None of the practical risk management factors that are considered by the USEPA or the California Department of Health Services (CDHS) in setting MCLs are considered in setting the PHGs. These factors include analytical detection capability, treatment technology available, benefits and costs. The PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the USEPA's equivalent to PHGs.

Water Quality Data Considered:

All of the water quality data collected by our water system between 2001 and 2003 for purposes of determining compliance with drinking water standards were considered for this report. These data were summarized in our 2001, 2002, and 2003 annual Consumer Confidence Reports which were mailed to all of our customers in June of each year. Copies of the latest report and

additional information concerning water quality and the Water Department may be viewed at www.sandiego.gov/water.

Best Available Treatment Technology and Cost Estimates:

Both the USEPA and CDHS specify Best Available Technologies (BATs) which are the best known methods of reducing contaminant levels to meet the MCL. Costs can be estimated for such technologies. However, since many PHGs and all MCLGs are set much lower than the MCL, it is not always possible, nor feasible, to determine what treatment is needed to further reduce a constituent to the PHG or MCLG, many of which are set at zero. Estimating the costs to reduce a constituent to zero is difficult, if not impossible because it is not possible to verify by analytical means that the level has been lowered to zero. In some cases, installing treatment to try and further reduce very low levels of one constituent may have adverse effects on other aspects of water quality. For example, using chlorine to disinfect the water in the distribution system would provide better protection from coliform bacteria, but would cause the City to exceed the MCLs for disinfection by-products, some of which are suspected carcinogens. Therefore, the City uses a combination of chlorine and ammonia to disinfect the distribution system, which forms low levels of disinfection by-products and meets the regulations.

Constituents Detected that Exceed a PHG or a MCLG:

Water delivered in the City of San Diego exceeded three PHGs or MCLGs during this period, out of 92 constituents that meet the reporting requirements. They were coliform bacteria, uranium, and copper. The levels for all three of these constituents were well below the MCLs, so this does not constitute a violation of drinking water regulations or indicate the water was unsafe to drink. These results could be considered typical for a California water agency. More detailed information for these three constituents follows.

Coliform Bacteria:

During 2001, 2002, and 2003, we collected between 410 and 537 samples each month for total coliform analysis. Coliform Bacteria exceeded the MCLG in seven of the 36 months, with the high being 1.2 % of the samples contained total coliform for one month. The MCL for coliform is 5% positive samples of all samples per month and the MCLG is zero. The water entering the distribution system from the water treatment plants met the MCLG of zero percent for total coliform for every month. It is likely that the positive samples were due to debris entering the sample at the sample station during sampling.

The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens which are organisms that cause waterborne disease. Coliform bacteria are indicator organisms that are present everywhere in nature and are not generally considered harmful. They are used because of the ease in monitoring and analysis. If a positive sample is found, it indicates a potential problem that needs to be investigated and follow-up sampling conducted. It is not at all unusual for a system to have an occasional positive sample. It is difficult, if not impossible to assure that a system will never get a positive sample.

Because coliform is only an indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. While USEPA normally sets MCLGs "at a level where no known or anticipated adverse effects on persons would occur," they indicate that they cannot do so with coliforms.
We add chloramines at our treatment sources to assure that the water in the distribution system is microbiologically safe. The chloramine residual levels are carefully controlled to provide the best health protection without causing the water to have undesirable taste and odor or increasing the disinfection byproduct level. This careful balance of treatment processes is essential to continue supplying our customers with safe drinking water.

Other equally important measures that we have implemented include: an effective cross-connection control program, a raising air valve program, an effective monitoring and surveillance program and maintaining positive pressures in our distribution system. Our system has already taken all of the steps described by California Department of Health Services as "best available technology" for coliform bacteria in Section 64447, Title 22, CCR.

Uranium:

The requirement for radiological monitoring, including uranium, is four consecutive quarters every four years. San Diego Water Department radiological results are from the year 2002. The next radiological monitoring is scheduled for 2006. City of San Diego's uranium results ranged from 2.49 to 4.89 pCi/L. The average uranium level was 3.46 pCi/L.

The State of California has an MCL for uranium of 20 pCi/L based on earlier studies of toxicity to the kidney in rabbits. Cancer risk is stated in terms of excess cancer cases per million (or fewer) population. The numerical health risk for uranium based on the California MCL is 1×10^{-5}. This means one excess cancer case per 100,000 population. The Public Health Goal for uranium is 0.43 picoCuries per liter (pCi/L). The health risk category for uranium is carcinogenicity; chronic toxicity (cancer, human data; kidney toxicity). Carcinogenic risk means capable of producing cancer. Chronic toxicity risk means there may be adverse effects that usually develop gradually from low levels of chemical exposure and that persist for a long time.

Uranium is a naturally-occurring radioactive element that is present in the earth's crust. Uranium is found in ground and surface waters due to its natural occurrence in geological formations. The average uranium concentration in surface, ground and domestic water are 1, 3, and 2 Ci/L. The primary non-carcinogenic toxic effect of uranium is on the kidneys. Recently published studies in rats, rabbits and humans show effects of chronic uranium exposure at low levels in drinking water.

The best available technology (BAT) for uranium to lower the level below the MCL is reverse osmosis (RO). Since the uranium level is already below the MCL, reverse osmosis would be required to attempt to lower the uranium level to below the PHG. Please note that accurate cost estimates are difficult, if not impossible, and are highly speculative and theoretical. All costs including annualized capital, construction, engineering, planning, environmental, contingency and O&M costs are included but very general assumption can be made for most of these items.

Cost estimating guides from ACWA guidance report were used in determining the estimated cost to implement the BAT. The City's treatment capacity is 295 million gallons per day. The estimated cost to install and operate a RO treatment system at the City's three treatment plants would cost between $130 – $290 million/yr for the life of the system. The City has 268,000 service connections. The cost per service connection would range from $485 to $1,080 per year. There would be additional costs for corrosion control because water treated by RO is corrosive and could cause the water to exceed lead and copper regulations (see below).

Copper:

The regulations for copper are different because sampling is performed at a representative number of household faucets instead of the normal water system sample sites. This is because home pipes and plumbing fixtures can contribute significant amounts of copper to drinking water. The regulations require water agencies to deliver water that is non-corrosive to keep significant amounts of copper from the faucets leaching into the drinking water. There is no MCL for copper. Instead the 90th percentile value of all samples from household taps in the distribution system cannot exceed an Action Level of 1.3 mg/l for copper. The PHG for copper is 0.17 mg/l. The 90^{th} percentile is the level of copper that 90% of the samples contain from 0.17 mg/l or 1.3 mg/l.

All of our treated water samples from the treatment plants were less than the PHG for copper in 2001 through 2003. Based on extensive sampling of tap water samples in homes in 2002, our 90th percentile value for copper was 0.35 mg/l. The home tap sampling is only required once every three years.

The category of health risk for copper is gastrointestinal irritation. Numerical health risk data for copper has not yet been provided by OEHHA, the State agency responsible for providing that information.

Optimizing corrosion control is considered to be the best available technology to reduce copper levels from home plumbing fixtures. Since our extensive monitoring program shows that copper levels are well below the action level for copper and that our water is non-corrosive, our corrosion control is optimized. We continue to monitor our water quality parameters that relate to corrosivity, such as the pH, hardness, alkalinity, total dissolved solids, and will take action if necessary to maintain our system in an "optimized corrosion control" condition. Adding corrosion inhibitors to our water, such as zinc orthophosphate, may further reduce the amount of copper leached from plumbing enough to meet the public health goal, but testing would be required to confirm its effectiveness. Adding phosphates can also increase the levels of bacteria in the distribution system, since it is an essential nutrient for bacterial growth.

Recommendations for Further Action:

The drinking water quality of the City of San Diego meets all CDHS and USEPA drinking water standards set to protect public health. To further reduce the levels of the constituents identified in this report (that are already significantly below the health-based MCLs) to provide "safe drinking water," additional costly treatment processes would be required. The effectiveness of

the treatment processes to provide any significant reductions in constituent levels at these already low values is uncertain. The health protection benefits of these further hypothetical reductions are not at all clear and may not be quantifiable. In addition, treatment processes to reduce levels of one constituent could also result in MCLs, PHGs, or MCLGs to be exceeded for other constituents. Therefore, no action is proposed at this time.